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Landnutzung und Kohlenstoffhaushalt

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Titel
Peat decomposition indicators of two contrasting bogs in the Eastern Alps, Austria

Abstract
Since carbon (C) in peatlands is labile and sensitive to disturbances, peatlands have the potential to release high C amounts by land use changes and to accelerate global warming. Therefore, adequate peat decomposition indicators (PDI) are necessary to assess the peatland degradation status and potential for CO_2 release.
In order to assess the peat degradation status of nine sites in Alpine bogs (Enns valley, Austria), we compared PDI of two peat bogs with contrasting land-use histories. The conventional PDI: loss on ignition, bulk density, C:N ratios, water table depths (WTD) were compared with the recently introduced PDI: stable carbon isotope signature (d13C) and nitrogen isotope signature (d15N).
The most PDI were different between the two bogs and the study sites with contrasting WTD and degree of peat decomposition. We demonstrated strong relationships and similar depth profiles of variables: Loss of ignition of strongly degraded peat decreases from the acrotelm to the catotelm, but remains stable at less degraded peat. Bulk density generally increases with depth, and was lowest in the acrotelm of the central bog area and highest in the catotelm of the former peat cutting areas. C:N ratios increased slightly with the degree of peat decomposition. d13C and d15N increased from the top to the depths of -24 to -42 cm at all study sites. In the catotelm, dC13 were significantly lower in strongly decomposed peat compared to the less degraded sites. Higher d15N values in acrotelm and catotelm of strongly degraded peat may be evidence for more pronounced N fractionation during decomposition compared to less degraded sites. Decomposers tend to preferably use substances with 12C for respiration, resulting in a relative enrichment of 13C in the residual organic matter. Accordingly, the increase of d13C with depth in the acrotelm in strongly decayed peat may be assigned to 12C loss by respiration.